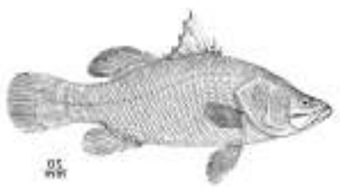
Resting metabolism and hypoxia tolerance are conserved across genetically distinct sub-populations of Australian Barramundi (*Lates calcarifer*)



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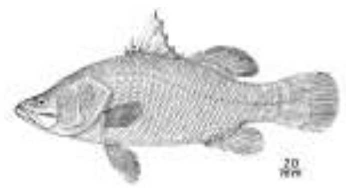


Background

Progressive climate change is resulting in a greater frequency and severity of hypoxic environments. This influences all aquatic organisms. To investigate the potential impacts and capacity for local adaptation, our model species was one of the most iconic fishes in tropical Australia: the barramundi.

Hypoxia = low dissolved oxygen

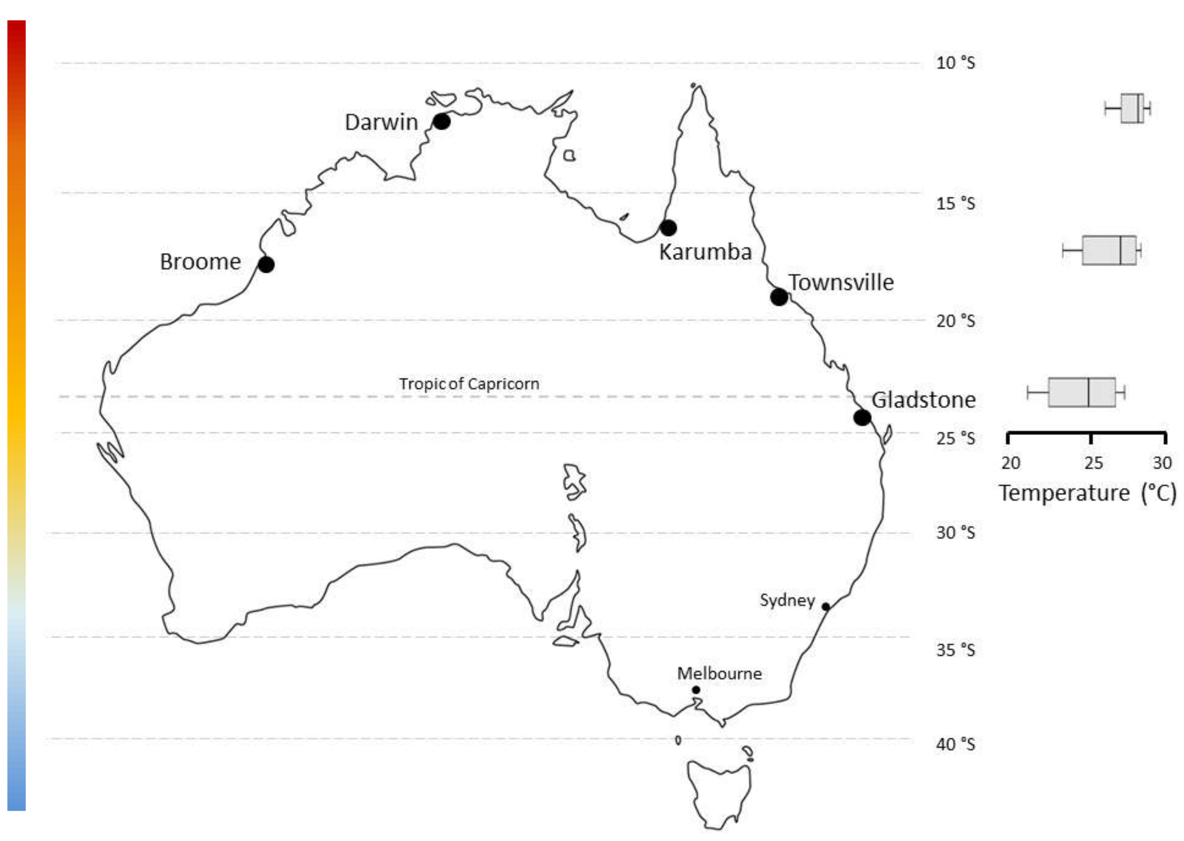
Research Questions

1. How tolerant are barramundi of environmental hypoxia?

2. Does hypoxia tolerance change with temperature?

3. Does hypoxia tolerance differ between sub-populations?

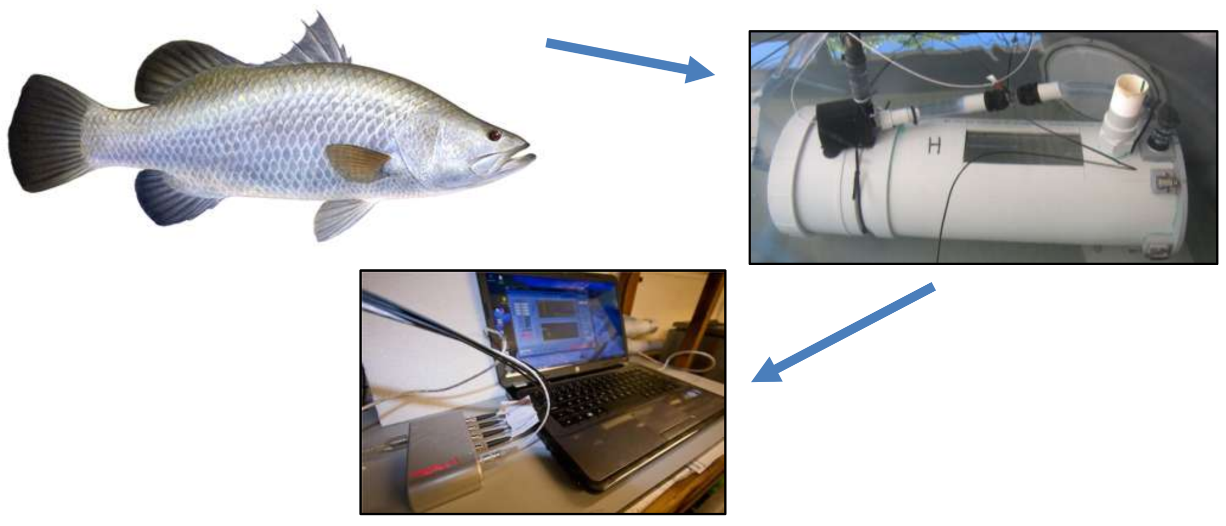
Genetically Distinct Sub-Populations



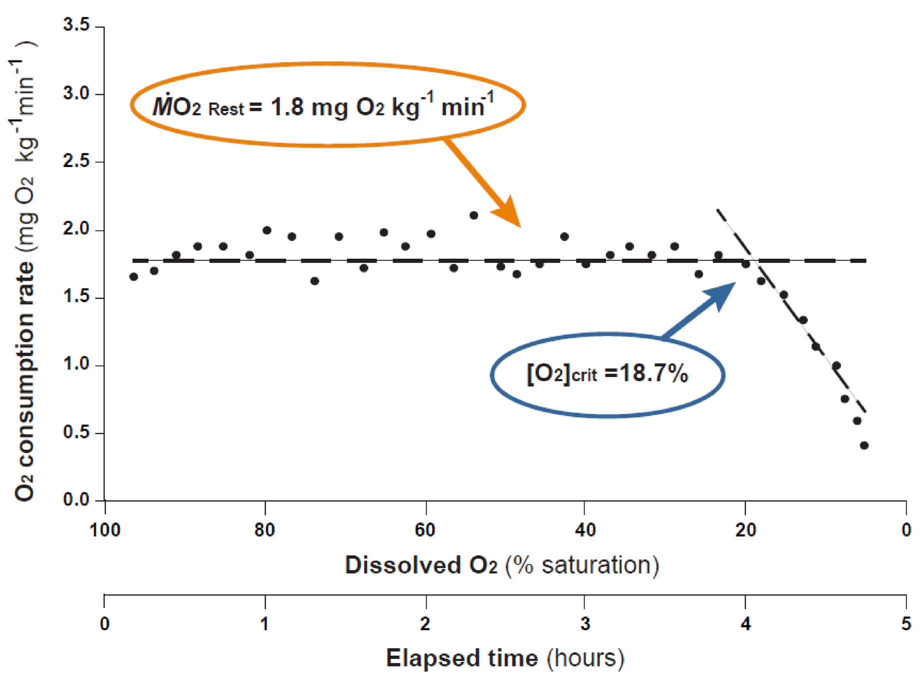
Map of Australia, depicting locations of genetically distinct sub-populations of barramundi used in this study. Boxplots on the right depict the mean temperature and variation in temperature at three locations across the species distribution, with temperatures at low (equatorial) latitudes characterised by a higher mean and lower variability.

Respirometry

Intermittent flow-through respirometry was used to measure oxygen consumption (**$\dot{M}O_2$**)

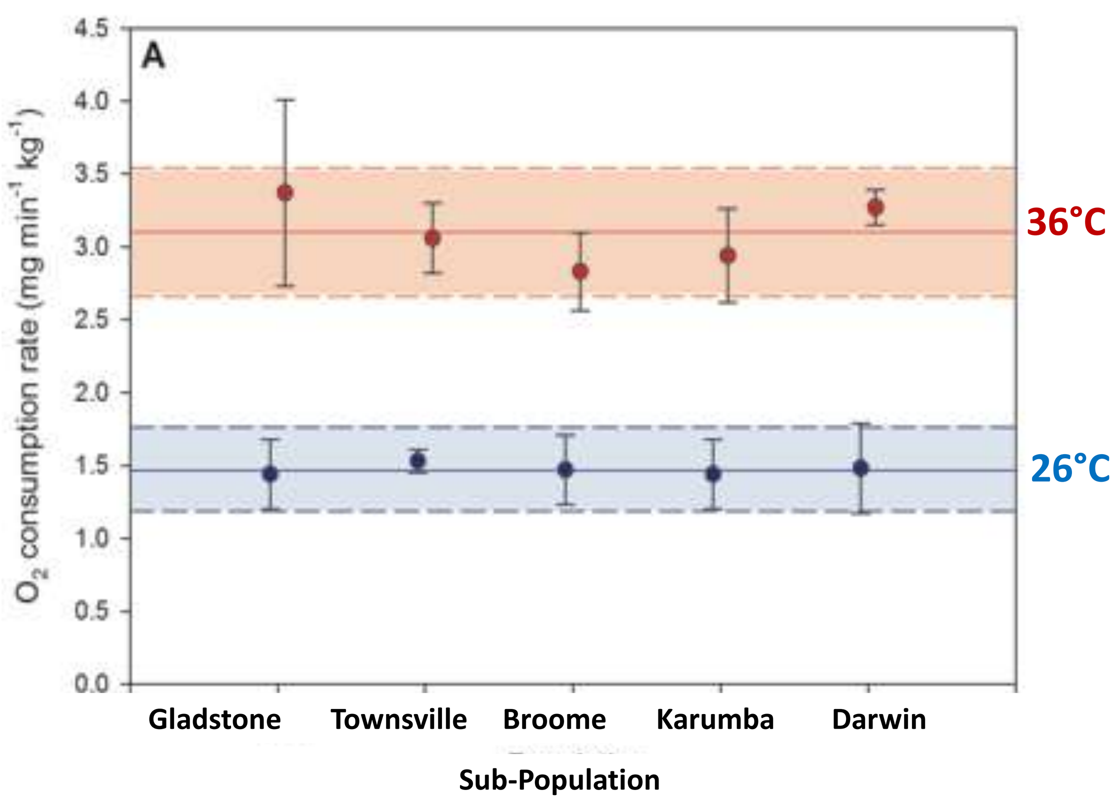


Oxygen Consumption



1. All barramundi can regulate their $\dot{M}O_2$ down to ~ 30 % saturation and can be considered highly tolerant of hypoxia

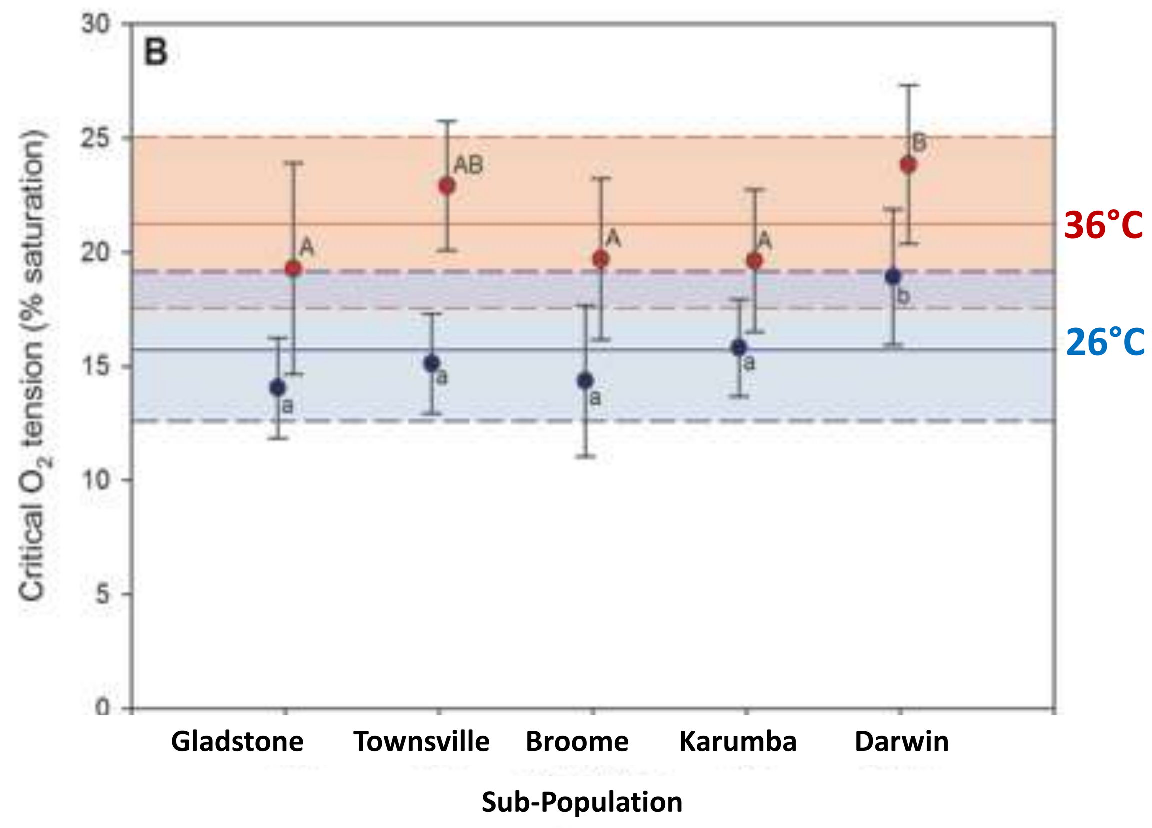
Resting Oxygen Consumption



Barramundi consumer **twice** as much O_2 at 36°C than at 26°C (Q_{10} = 2.1 ± 0.3)

Hypoxia Tolerance

The critical oxygen tension (**$[O_2]_{crit}$**: the point at which an animal is no longer able to regulate O_2 consumption independent of the surrounding environment) was used as an **indicator of hypoxia tolerance**



2. Barramundi remain tolerant of environmental hypoxia at higher temperatures

3. We were unable to find conclusive evidence for differences in hypoxia tolerance between different sub-populations

Outcomes and Implications

Barramundi have evolved in environments with variable temperature, rainfall and dissolved O_2 and thus may be resilient to global climate change

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